

AN OVERVIEW OF THE RECENT DEVELOPMENTS IN 3D WOVEN SPACER FABRICS AND NEAR-NET-SHAPE PREFORMS AT HOF UNIVERSITY

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Abstract: This study aims to describe the recent developments in 3d woven spacer fabrics and near-net-shape preforms at the Institute of Materials Science, Hof University of Applied Sciences; including one-piece weaving method of spacer fabrics with partial chambers and solution approaches for the weaving of 3d preforms for airfoil structures

Keywords: 3d weaving, spacer fabric, near-net-shape, preform.

Weaving technique is being used since for so many years to produce 3d textile structures and preforms. Woven spacer fabrics and weaving of the structure in 2d medium to unfold it to 3d medium are some techniques which have been developed during these so many years. Woven spacer fabrics consist of two separate outer layers that are combined using binding yarns - keeping a space between two outer layers and referred as three dimensional textile structures. Face to face weaving technique and use of lancets for the adjustment of the distance between top and bottom layers are the mostly used methods [1,2]. Lancets are mainly used all through the fabric width without any lack of them. However it can be possible to arrange the lancets intermittently to a predefined width of chamber fabric. It can bring a flexibility for the production of distance fabrics as side-closed structures in order to produce a side-chamber fabric with a targeted width.

Development of 3d woven spacer fabrics and near-net-shape preforms is accelerated at the Institute of Materials Science, Hof University of Applied Sciences with the purchase of the new technical double rapier weaving machine [3]. In this study the one-piece weaving method of distance fabrics with partial chambers from polyester multifilament yarns using a technical double rapier weaving machine will be described. Setup of different warp yarn systems and the newly lancet arrangement will be described and general findings will be summarized. Furthermore, solution approaches used for the weaving of 3d near-net-shape preforms (Fig. 1) for CMC (Ceramic Matrix Composite) airfoil structures will be presented.

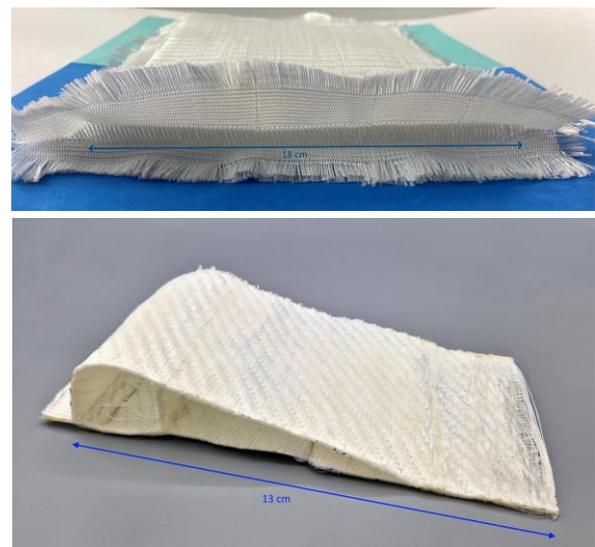


Figure 1 Examples of a one-piece woven spacer fabric with partial chambers (top) and a woven 3d preform for a CMC airfoil structure (bottom)

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